ENT-ICIPATE

Checkpoint #1

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FONDAZIONE links

1859

SALUS SCIENTIA

AZIENDA OSPEDALIERO-UNIVERSITARIA
Città della Salute e della Scienza di Torino

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OBJECTIVE

MISSION

Why we believe in this project

Early prediction of post-surgical complications can save lives, enhance patient recovery and help medical teams make timely, well-informed decisions

What we aim to achieve

Our mission is to build a reliable, interpretable and data-driven system that enhances clinical care, optimizes hospital resources, and supports ENT specialists throughout the entire post-operative pathway

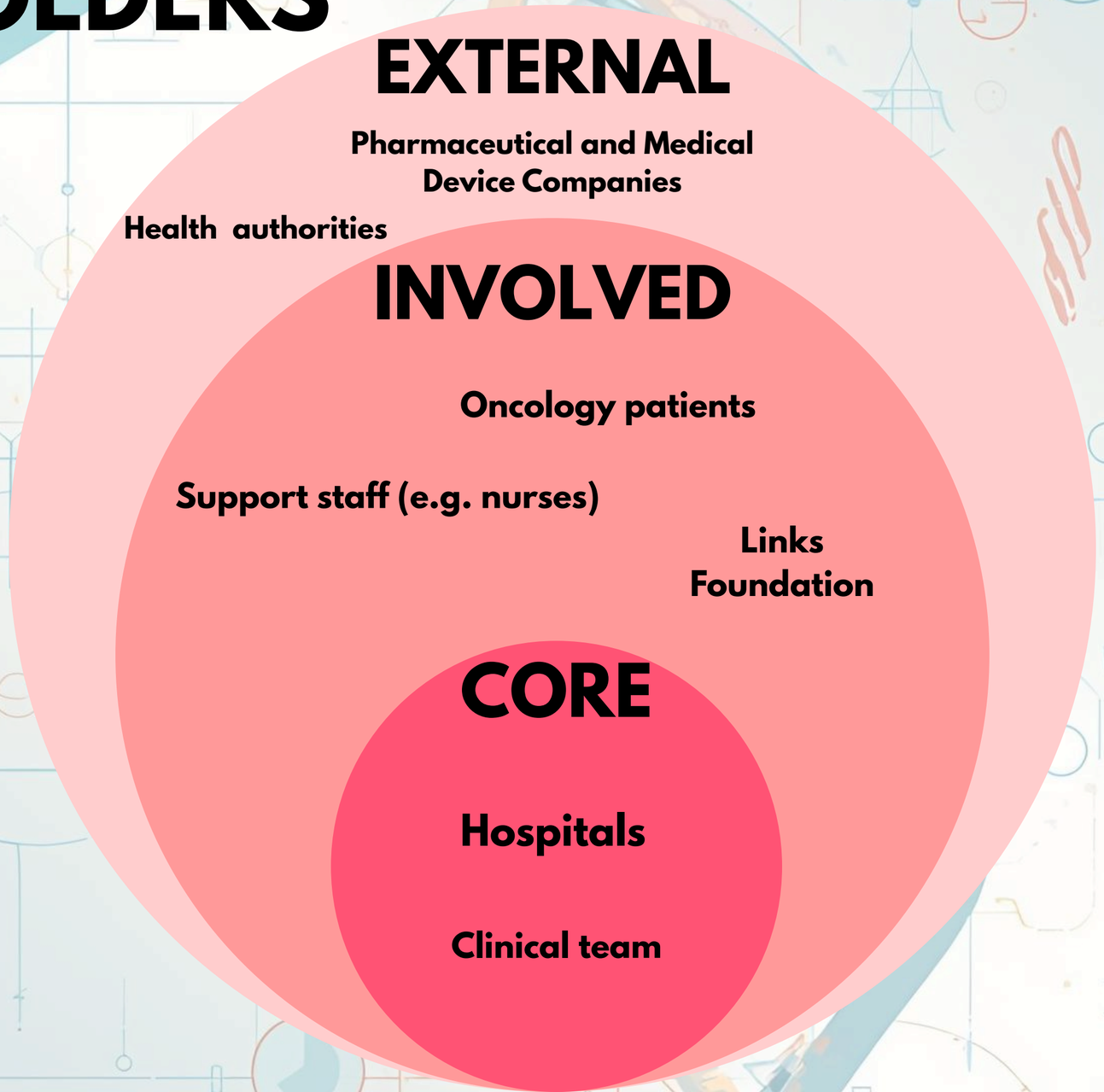
VALUE PROPOSITION

Improves patient safety and post-surgical outcomes through early, data-driven prediction of complications

Strengthens hospital decision-making infrastructure by integrating advanced machine-learning tools into clinical workflows

DESIGN

STAKEHOLDERS



USER PERSONAS

Dr. Emma Collins

(Age: 42)
ENT Surgeon

Mr. Marco Rossi

(Age: 51)
Resource Administration Manager

Core Values:
Accuracy, Patient Safety, Personalized Care

Pain Points:

- **Difficult to predict complications; decisions rely heavily on clinical experience**
- **Limited evidence-based tools for early identification of high-risk patients**
- **High cognitive workload and limited time for thorough analysis**

Core Values:
Efficiency, Resource Optimization, Protactive Planning

Pain points:

- **Unforeseen complications force resources to be reallocated at short notice, leading to unexpected ward overloads**
- **Lack of predictive tools for complication risk makes planning difficult**
- **Ward overloads and limited staff create high operational pressure to maintain hospital functioning**

DIARY OF AN USER PERSONA

As an ENT Surgeon, I want:

- an early and reliable prediction of post-surgery complications, so that I can quickly intervene and prevent critical outcomes for my patients, especially the most fragile oncology cases.
- a clear overview of the most important risk factors and indicators for each patient, so that I can personalize post-operative monitoring
- an interpretable model that explains why a patient is at higher risk, so that my medical decisions remain transparent, clinically grounded, and aligned with standard care practices.

DIARY OF AN USER PERSONA

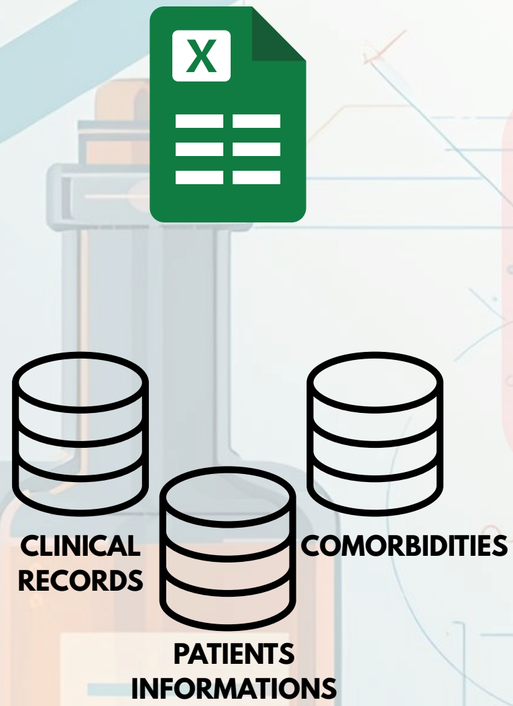
As a Resource Administration Manager, I want

- to view updated complication risk predictions for each patient so that I can plan staff allocation and ensure patient safety.
- to monitor predicted recovery trajectories, so that I can anticipate resource needs and optimize hospital operations.
- alerts for upcoming high-risk cases, so that I can prevent ward overloads and respond proactively

USER REQUIREMENTS

	FUNCTIONAL	NON-FUNCTIONAL
MUST HAVE	• The system generates predictions about the risk of post-surgical complications and nosocomial infection for a new patient. • The system produces an interpretable prediction report, including feature importance and key factors influencing the outcome.	• **Data Security**: data is managed in accordance with GDPR regulations and hospital-level security standards. • **Privacy**: personal identifiers are not accessible without authorization; all data is pseudonymized before processing. • **Interpretability**: make predictions understandable for staff, including contributing features and context for planning. • **Accuracy**: minimize false positives and false negatives.
SHOULD HAVE	• Explore patient data through summary statistics and static visualizations (e.g., incidence of complications, variable distributions, correlations).	• **Fairness**: identify and reduce bias across patient subgroups.
COULD HAVE	• Interactive interface to view predictions, reports, and simple charts. • The system predicts the hospitalization length	• **Extensibility**: add new prediction models to estimate for example tumor recurrence risk, predict treatment side effects, assess personalized recovery
WON'T HAVE	• Provide advanced frontend dashboards or real-time monitoring. • Provide recommendations that override medical judgment.	• **Interoperability**: does not connect the system to other hospital systems, because all data are manually collected by ENT doctors and external integration is not required for our system.

FUNCTIONAL DIAGRAM



PREPROCESSING

- Data cleaning
- Handling missing values

FEATURE SELECTION

- Correlation
- Select most relevant ones

MACHINE LEARNING MODELS

RANDOM FOREST

LOGISTIC REGRESSION

GRADIENT BOOSTING

OUTPUT

POST SURGERY COMPLICATIONS

PREDICT POSSIBLE NOSOCOMIAL INFECTION

MODEL RISKS

FALSE POSITIVES / NEGATIVES

MAY OVER OR UNDER-STIMATE PATIENT NEEDS,CAUSING WASTED RESOURCES OR INCREASED WORKLOAD

BIAS AND DISCRIMINATION

FAVORS WELL-REPRESENTED GROUPS (E.G., OLDER PATIENTS), UNDERESTIMATING RARE GROUPS (E.G., YOUNGER PATIENTS)

OVERFITTING

MANY FEATURES INCREASE COMPLEXITY, RISK OVERFITTING, AND REDUCE INTERPRETABILITY

HUMAN FACTOR RISK: CLINICIANS MAY DEPEND TOO MUCH ON SYSTEM OUTPUTS, REDUCING CRITICAL JUDGMENT.

MANAGEMENT PLAN & GANTT

MANAGEMENT PLAN

Design

Define the personas involved, the project scope, and clarify why the project matters and for whom.

Development

Resource papers, Data analysis and selection of potential optimal models.

Starting point

Information retrievial from the introduction of the project and during classes

Final result

Final result: to be completed

Management

Define a timeline and schedule meetings with Links Fundation and Molinette Hospital

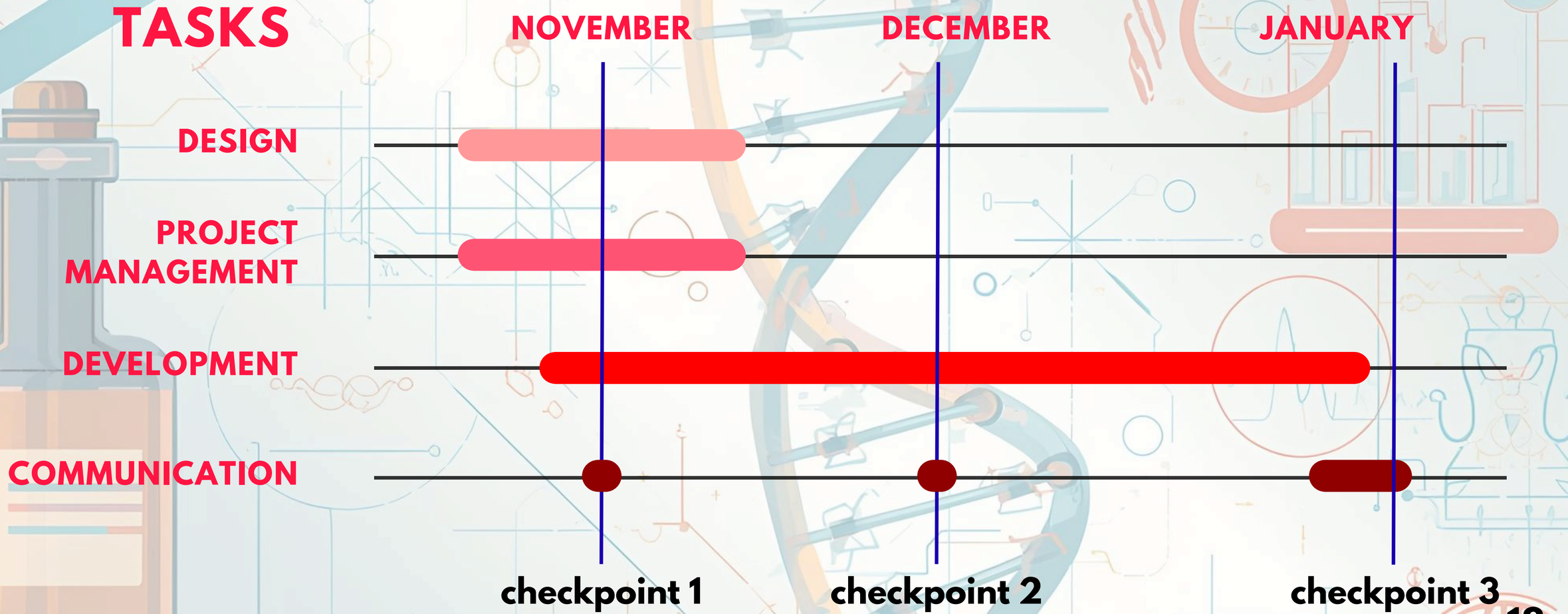
Communication

Prepare the presentation report and communicate the results in an understandable way

OVERVIEW OF THE WORK PACKAGES

WP no.	WP Title	Lead Name	Start Month	End Month
1	Design	J	Nov-25	Nov-25
2	Project Management	C	Nov-25	Nov-25
3a	Literature Review	J, C, S	Nov-25	Dec-25
3b	Data Preprocessing	C	Nov-25	Dec-25
3c	Model selection and Implementation	S	Dec-25	Dec-25
3d	Finetuning	J	Dec-25	Jan-26
3e	Testing and Validation	J,C,S	Dec-25	Jan-26
4	Communication	J,C,S	Nov-25	Jan-26

GANTT CHART


TASKS
NOVEMBER
DECEMBER
JANUARY
DESIGN
PROJECT MANAGEMENT
DEVELOPMENT
COMMUNICATION
checkpoint 1
checkpoint 2
checkpoint 3

THANK YOU

FOR THE ATTENTION

QUESTIONS?